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REMARKS

Claims 1, 2, 4-13, and 15-20 are pending in the present application. In the Office Action mailed January 26, 2005, the Examiner rejected claims 8-13 under 35 U.S.C. §103(a) as being unpatentable over Higgins et al. (USP 3,839,628) in view of Kliman (USP 6,199,023). The Examiner objected to claims 15-17 because of informalities. Applicant appreciates the indication that claims 1-7 and 15-20 are in condition for allowance.

Claim 1 has been amended to correct a typographical error. Specifically, claim 1 has been amended to delete a duplicative "." at the end of the claim. Claims 15 and 17 have also been amended per the Examiner's suggestion.

Claims 8-13 stand rejected under 35 U.S.C. §103 as being unpatentable over Higgins et al. in view of Kliman. The Examiner asserted that it can be "inferred" that the machine monitoring system of Higgins et al. differentiates noise from mechanical anomalies. This inference can be drawn, according to the Examiner, in light of Higgins et al.'s teaching that "when the power signal has changed when compared to the base-line power signal, but the threshold has not been exceeded, this means that the system does differentiate between noise, which makes the power signal different from the base-line power, and mechanical anomalies, where the power signal is above the threshold (inferred from cols. ¾, ll. 32-68/1-30)." *Id.* Thus, according to the Examiner, if a threshold is exceeded, a mechanical anomaly is present and anything less than the threshold but different from the base-line signal is noise. Relying on such a construction is clearly an application of impermissible hindsight as the references themselves fail to suggest or infer such a conclusion.

Higgins et al. neither explicitly nor implicitly differentiates between noise and mechanical anomalies. The motor monitoring system of Higgins et al. is designed to indicate a fault or abnormal condition if actual operating conditions deviate from base-line conditions by a predefined variance. Higgins et al. neither teaches nor suggests that any variation from base-line operation that exceeds the predefined variance is presumed to be the result of a mechanical anomaly. For that matter, Higgins et al. neither teaches nor suggests that a variation less than the predefined variance is considered noise. That is, a variation that does not exceed the predefined variance could be the result of noise, mechanical anomaly, or a combination of both. In the system of Higgins et al., such a pre-threshold variance is simply not sufficient to "sound the alarm". Furthermore, Higgins et al.'s system cannot determine if a post-threshold variance is a result of a powerful mechanical anomaly or significant noise in the system. Under both

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conditions, the "alarm" will be sounded, but there is no mechanism in the system of Higgins et al. to make a distinction between the two.

In the claimed invention, as called for in claim 8, a processor is able to make such a distinction. Unlike Higgins et al., the claimed invention calls for the threshold that defines the boundary between noise and mechanical anomalies. The Examiner has concluded that such a teaching is implied by Higgins et al. However, the Examiner has drawn such an inference in light of the claimed invention as Higgins et al. makes no such teaching or provides no such suggestion. Moreover, one skilled in the art would not conclude that Higgins et al. teaches a system that differentiates between noise and mechanical anomalies. Such an inference can only be drawn by the application of impermissible insight.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1, 2, 4-13, and 15-20.

Applicant appreciates the Examiner's indication that claims 1, 2, 4-7, 15-18, 19, and 20 are in condition for allowance. Applicant can appreciate the Examiner's desire to clarify the file history by providing a separate statement of reasons for allowance; nevertheless, Applicant believes that such a separate statement was unnecessary as the file history is believed to sufficiently set forth the patentable distinctions of the allowed claims. Moreover, a single particular element or "primary reason" of a claim does not define the claim's patentability, but rather, it is each of the elements in the interconnection therebetween that define that which is claimed. As such, with respect to claim 1, Applicant disagrees with the Examiner's characterization that "the primary reason for allowance is because the Prior Art does not disclose automatically disabling a pump when an undesirable torque condition exceeds a threshold, where the undesirable torque condition is determined based on frequency domain analysis of a power signal." Office Action, *supra* at p. 5. While Applicant agrees that the prior art fails to teach such limitations, Applicant disagrees that the patentability of claim 1 lies entirely within the aforementioned limitations. That is, it is the claim as a whole that defines patentability rather than a particular element or feature.

Similarly, with respect to claim 17, Applicant agrees that the prior art fails to teach or suggest delineating between a transient condition in the pump and an undesirable mechanical condition based on several cycles of undesirable harmonics in a real-time power signal; however, Applicant believes that patentability does not rest alone within this single limitation. As stated above, patentability lies in the claim as a whole, not within a particular feature or element.

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Accordingly, Applicant disagrees with the Examiner's assertion that patentability lies in a single element.

Additionally, with respect to claim 19, Applicant appreciates the Examiner's indication that the prior art fails to teach or suggest interrupting pump operation in response to an indication of a mechanical disturbance, where the result of a comparison of a spectrum analysis indicates mechanical disturbances. However, Applicant does not believe that the "primary reason" for patentability lies solely within the aforementioned limitation. That is, Applicant believes that the claim as a whole define its patentability and that, as a result, there are not "primary" or "secondary" reasons that define the claim over the art.

Additionally, the claims cannot be considered to be limited in scope based on the statement provided by the Examiner. As set forth above, the claims are not limited only to a particular feature or limitation or figure set forth in the application. Furthermore, Applicant does not acquiesce to the accuracy of the Examiner's statements and reasons for allowance nor to the Examiner's partial incomplete paraphrasing of certain claimed elements.

As set forth in the file history, the art of record fails to teach or suggest a motor controller for a motor driven pump wherein the controller has at least one voltage sensor and at least one current sensor, and is configured to receive a voltage and a current signal of a pump in operation from the at least one voltage sensor and the at least one current sensor, determine a power signal from the voltage signal and the current signal, generate a real-time spectrum analysis of the power signal, determine undesirable torque conditions in the pump from the spectrum analysis, and automatically disable the pump if the desirable torque condition exceeds a threshold.

Furthermore, the art of record fails to teach or suggest a computer readable storage medium having stored thereon a computer program to detect and signal mechanical anomalies in a motor driven centrifugal pump and representing a set of instructions that when executed by a processor causes the processor to determine an instantaneous pump motor power signal from voltage and current data collected by one or more voltage and current sensors in a motor starter of a motor driven centrifugal pump, signal process the instantaneous pump motor power signal, compare the processed instantaneous pump motor power signal to a pump motor power signal modeled during healthy operation of the pump motor, provide an external notification signaling mechanical anomalies in the pump if the process instantaneous pump motor signal exceeds the threshold and differentiate noise from mechanical anomalies.

Similarly, the art of record fails to teach or suggest a method of detecting mechanical anomalies in an operating centrifugal pump motor that includes the steps of capturing an

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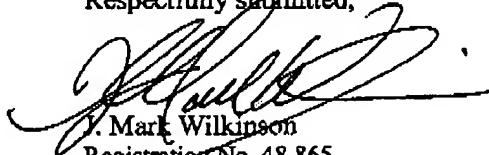
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operational model of a centrifugal pump motor assembly known to be operating normally, generating a base-line power signal from the model, acquiring instantaneous voltage and current signals of the pump motor assembly from voltage and current sensors in the motor assembly, determining a real-time power signal from the instantaneous voltage and current signals, determining undesirable harmonics and a real-time power signal based on a comparison with the base-line power signal, and delineating between a transient condition in the pump and an undesirable mechanical condition based on several cycles of undesirable harmonics in the real-time power signal.

Additionally, the art of record fails to teach or suggest an apparatus for detecting undesirable torsional/mechanical conditions in a pump wherein the apparatus includes at least one voltage sensor and at least one current sensor and a processor configured to receive data from the at least one voltage sensor and the at least one current sensor, wherein the processor has a means for determining a power signal from the voltage and current data, means for generating a spectrum analysis of the power signal, means for comparing the spectrum analysis to a spectrum analysis of a modeled power signal, means for determining undesirable harmonics indicative of mechanical disturbances in the pump from the comparison, and means for interrupting pump operation in response to an indication of a mechanical disturbance.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,



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